

# LESSONS LEARNED: BIODIVERSITY AND CLIMATE MODELING WORKSHOP SERIES

NASA Biodiversity and Ecological  
Forecasting Team Meeting  
Wednesday, April 25

Bonnie Myers and Sarah Weiskopf, USGS  
National Climate Adaptation Science  
Center



Southwest Climate  
Science Center



**NATIONAL CLIMATE ADAPTATION SCIENCE  
CENTER**

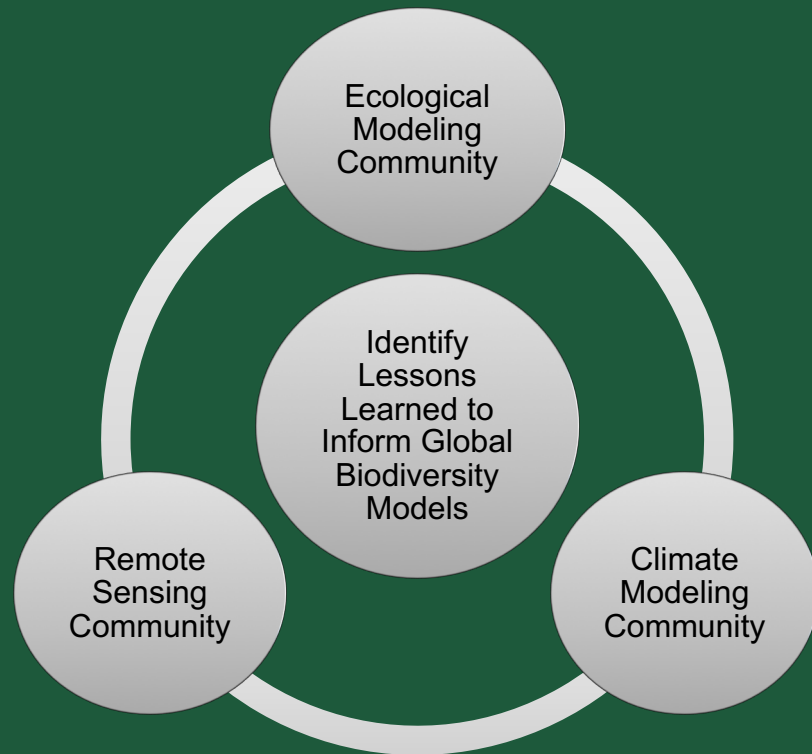
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# WORKSHOP PIS

- **Douglas T. Beard**, USGS National Climate Adaptation Science Center
- **Derek Tittensor**, UNEP World Conservation Monitoring Centre
- **Mike Harfoot**, UNEP World Conservation Monitoring Centre
- **Gabriel Senay**, EROS, North Central Climate Adaptation Science Center
- **Steve Jackson**, DOI Southwest Climate Adaptation Science Center

# INTRODUCTION

- Many diverse biodiversity models exist to answer certain questions and many lie along a continuum
- Biodiversity modeling at the global scale lacks analogous tools, such as GCMs



- Biodiversity and ecosystems services underpin political targets for the conservation of biodiversity



# OVERALL OBJECTIVES OF WORKSHOP SERIES

- (1) **Provide recommendations** on improving large-scale **biodiversity models** through lessons learned from the climate community;
- (2) Explore new applications of NASA and other **remote sensing products** to assist in biodiversity modeling (new variables to measure?, What would be the RS requirements?);
- (3) Address and build on **gaps and data needs** to inform **IPBES efforts and GEOBON EBV development** and tracking and development of **Aichi Biodiversity Targets**;



# WORKSHOP PARTICIPANTS



National Aeronautics and Space Administration  
Goddard Institute for Space Studies



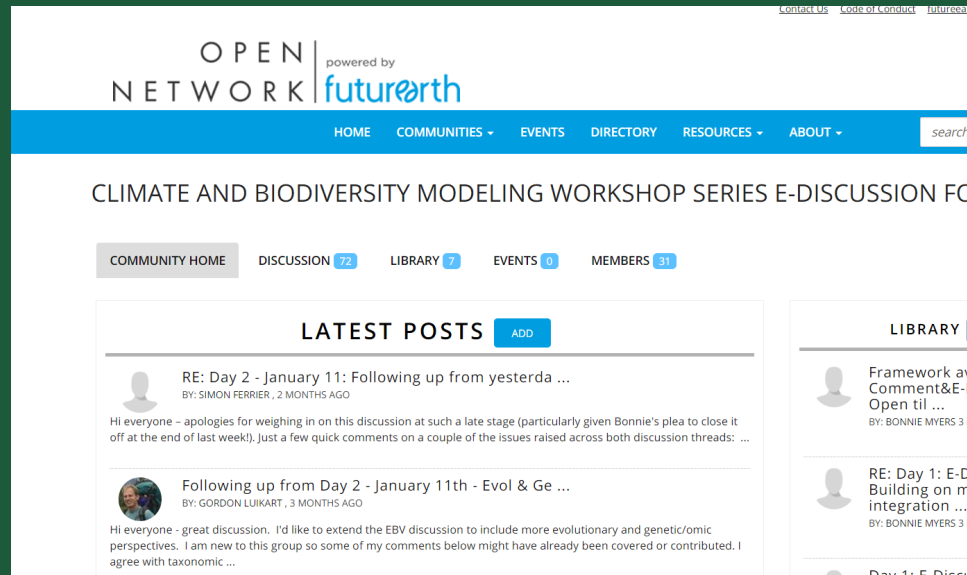
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# COMPONENTS OF WORKSHOP SERIES



Two E-Discussions 2017  
&2018



Two In-Person Meetings  
(Reston, VA & Tucson, AZ)

# SUMMARY OF MAIN IDEAS

## I. Framework for Refinement and Improvement

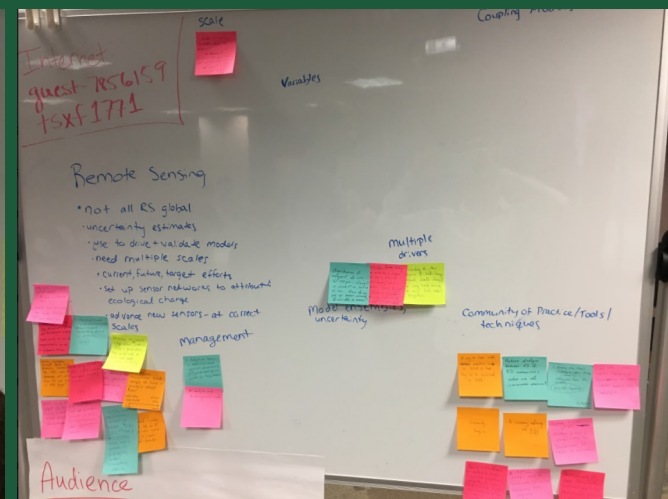
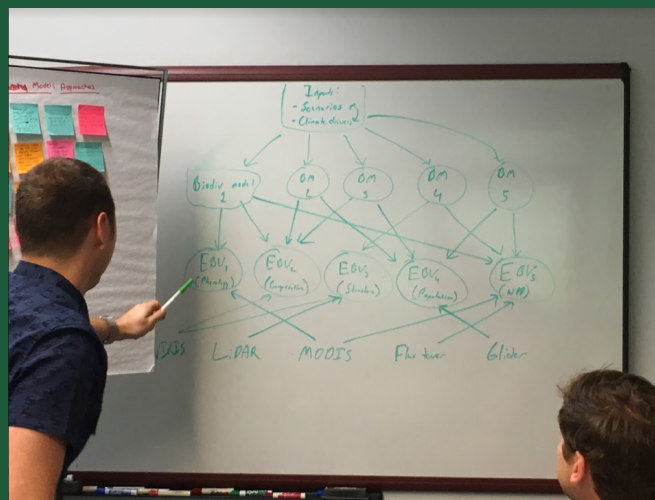
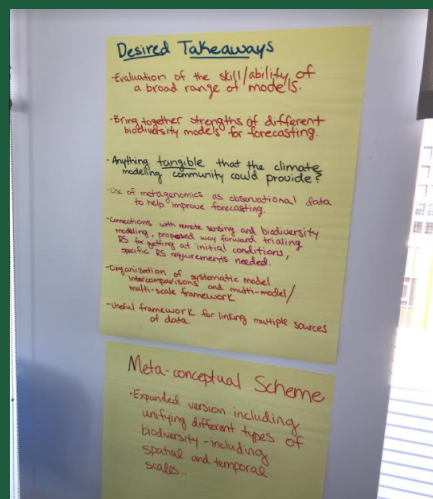
- Leverage diversity of models, data streams (including remote sensing), and information on drivers

## II. Lessons Learned

- Recommendations for issues that have been addressed in other modeling communities

## III. Meta-conceptual Model

- Determine conceptual roadmap for integration of the diversity of models





# I. FRAMEWORK FOR TESTING

**Need:** Model-based projections of global biodiversity are critically needed to support policymakers in the development of informed global conservation targets.

Lack a clear strategy for integrating diverse data streams in developing, and evaluating the performance of, such biodiversity models.

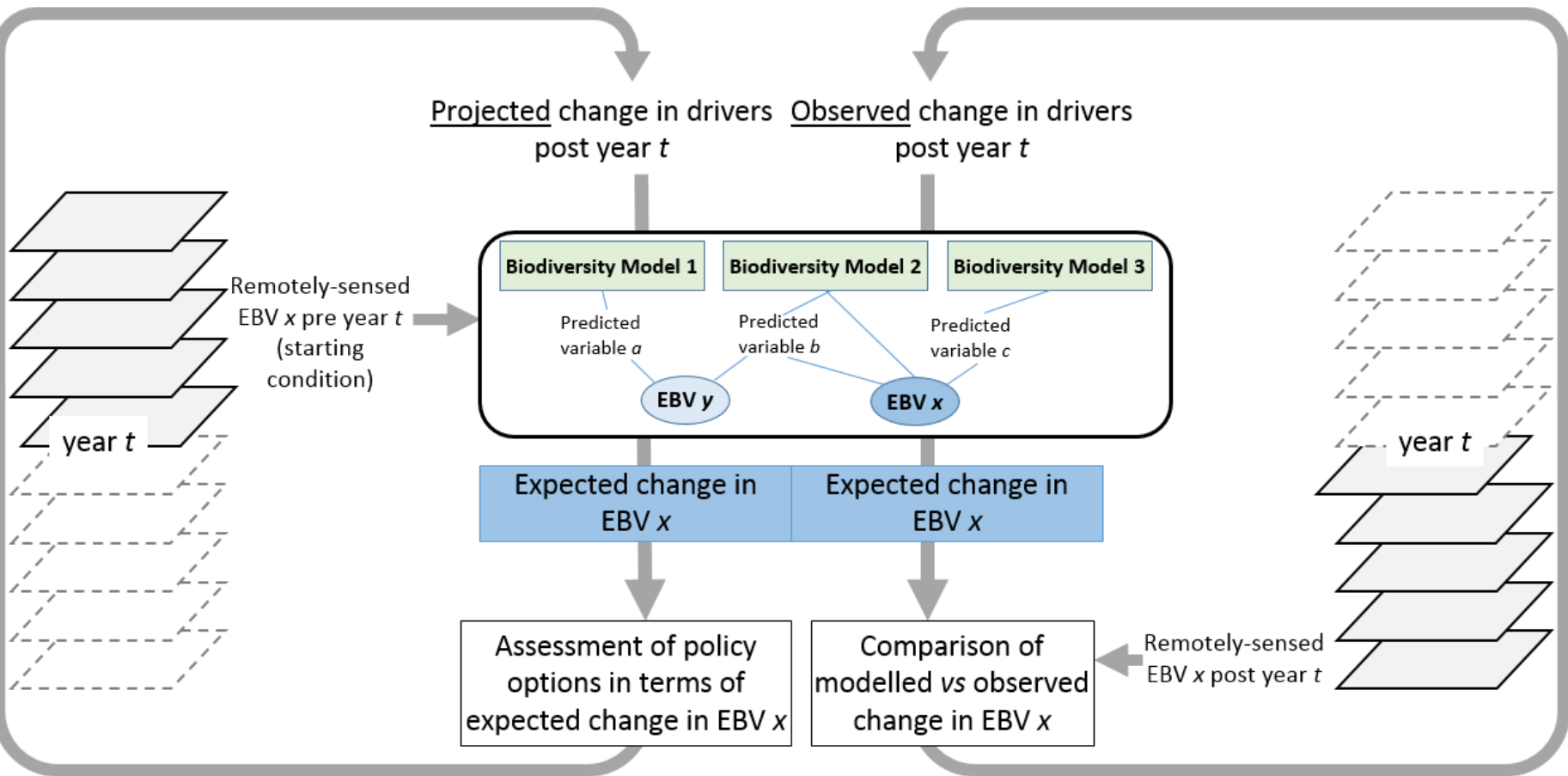
## Objectives:

- (1) Develop a framework for model testing and refining projections of a broad range of biodiversity models through the integration of diverse data streams.
- (1) Identify realistic applications of the framework that could be applied to inform development and tracking of the next generation of Aichi Biodiversity Targets,
- (3) Determine lessons learned from the climate community to inform a model testing and refinement framework

# I. FRAMEWORK FOR MODEL TESTING & REFINEMENT

Policy support

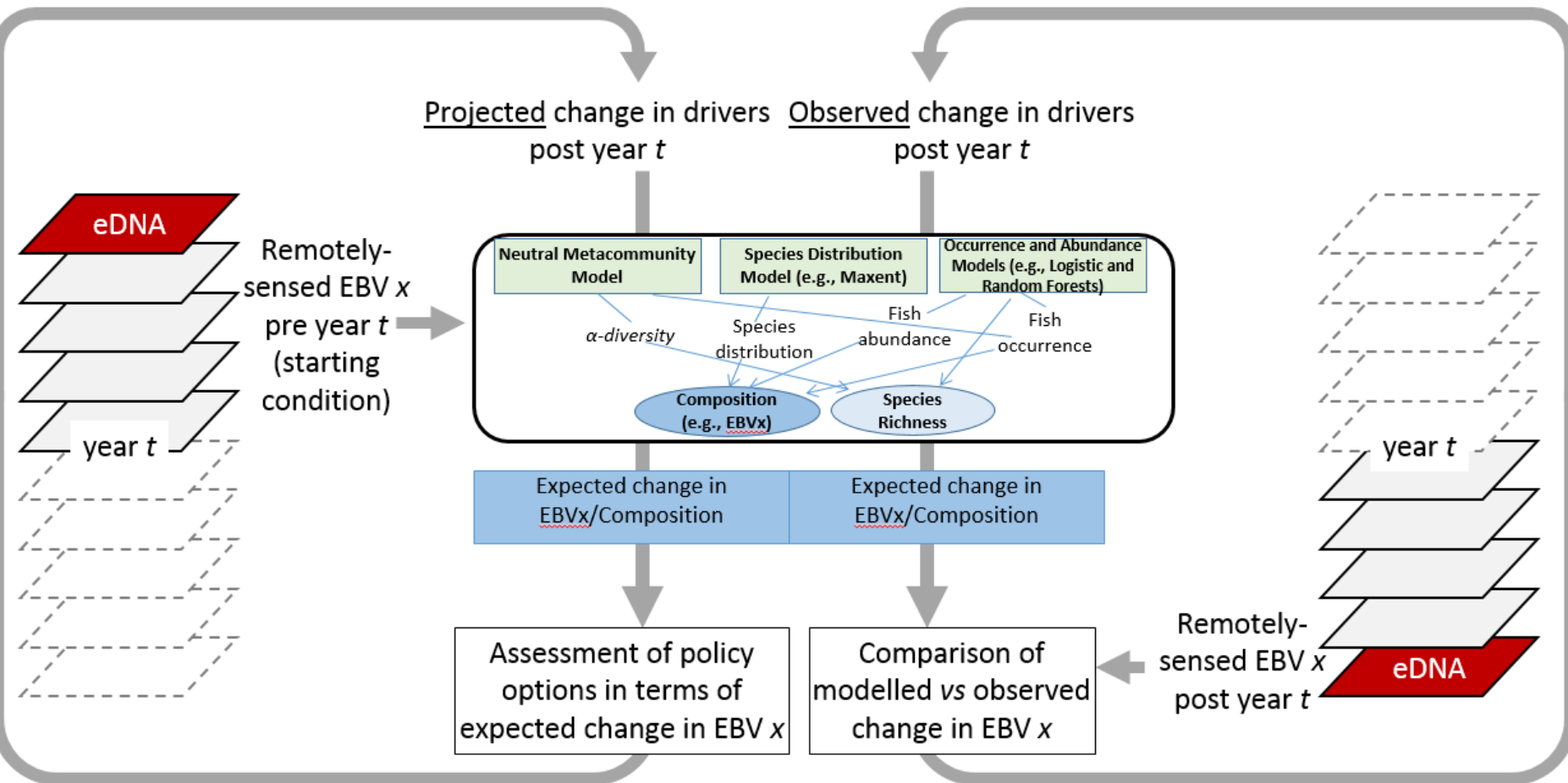
Model testing & refinement



# I. CONCEPTUAL APPLICATION

Policy support

Model testing & refinement



# I. FRAMEWORK CONCLUSIONS

- A need exists for **integration, comparison, and improvement of diverse models** using relevant remote sensing and in-situ data to provide accurate projections for development of policy options.
- **The proposed conceptual framework** underpinned by common output and available observational and remote sensing data of candidate Essential Biodiversity Variables **and can be applied across diverse ecosystems.**
- **Advances in eDNA** can help assess genetic diversity within and among populations and species and community composition to be used in model development and validation.
- **Such a framework has the** potential to drive model development toward specific indicators of interest, **such as candidate Essential Biodiversity Variables.**



# II. LESSONS FROM CLIMATE COMMUNITY

Need a model of initial state to make comparisons.

Clear protocols and standardized infrastructure for model inter-comparison, translation, and nesting.

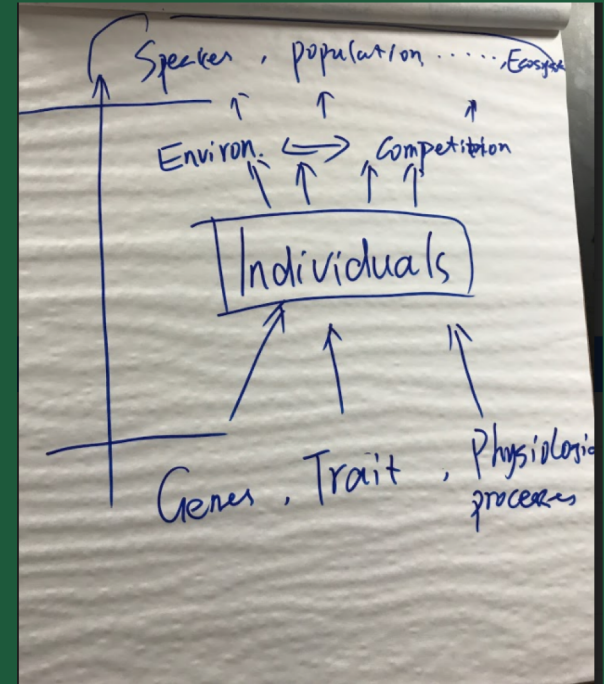
Importance of protocol-based analyses centered on clear questions and observations for validation along with leadership efforts to be inclusive.

Comparison of results against high-quality observational data.

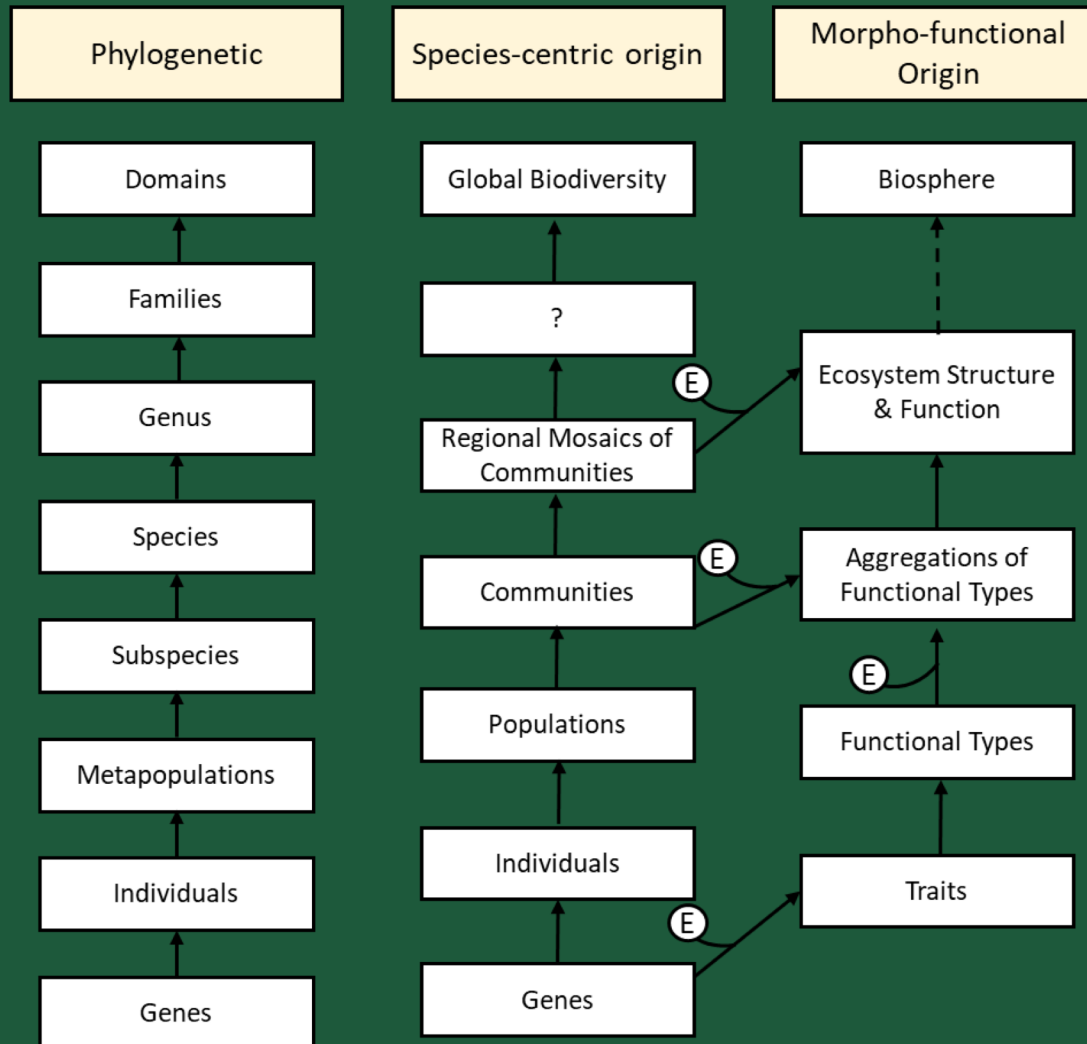
Develop tools to connect across disciplines and scales both for model inputs and outputs but also to allow consistently nested driving scenarios.

# III. BIODIVERSITY META-MODEL

- Few models cover entire scope of biodiversity
- No one standard or common understanding of biodiversity models
- Developing conceptual meta-model connecting measures of biodiversity



# III. BIODIVERSITY META-MODEL



- **Manuscript**
- **Working group proposal**



# PRODUCTS PROGRESS



- (1) Two poster presentations at AGU
- (2) White Paper Summary and Recommendations Report – to be posted on USGS ScienceBase
- (3) Framework Manuscript – in prep
- (3) Meta-model of Biodiversity: Developing Manuscript and Working Group Proposal

# KEY TAKE-AWAYS

- Diverse perspectives of what constitutes biodiversity modeling
- Remote sensing capabilities in measuring community composition variables
- EBV variables still being developed/identified
- Important lessons learned from climate community, such as model intercomparison efforts and community of practice
- Need better community of practice, but does the infrastructure already exist (e.g., IPBES, GEOBON, etc.)
- Need to integrate diverse biodiversity models that already exist
- Still a lot avenues of research to move forward global biodiversity modelling



# THANK YOU & ACKNOWLEDGEMENTS

Please direct any questions to Bonnie Myers ([bjmyers@usgs.gov](mailto:bjmyers@usgs.gov)) or Sarah Weiskopf ([sweiskopf@usgs.gov](mailto:sweiskopf@usgs.gov)).

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